OCEAN ECONOMY

A TRANSFORMATIONAL ECONOMIC RECOVERY STRATEGY

DEVELOPING A ROBUST AND RESILIENT OCEAN ECONOMY FOR PUERTO RICO TO SUPPORT ECONOMIC GROWTH

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DR 4339 PR
PR Economic Transformation Plan 1940’s

Shift from an Agrarian Economy to an Industrial Economy

Lessons learned:

• Identify key areas that need to be strengthened in order to sustain growth
• Transformation is achieved through vision, vision guides strategies, strategies define plans
• “The whole is greater than the sum of its parts” - Aristotle
Random projects don’t drive economic growth…
The opportunity lies in a holistic approach to develop Cross-Functional Solutions
Econ RSF: Economic Development Strategy

VISION

Nexus
Transformational

Opportunities
Strategies
Federal Partners already aligned to deploy resources and/or assist in Puerto Rico’s BLUE Economy Initiative
BLUE TIDE INITIATIVE
PUERTO RICO
WHY THE OCEAN ECONOMY AS AN ECONOMIC RECOVERY STRATEGY FOR PUERTO RICO?

- PUERTO RICO EXPRESSED THAT TOURISM IS AN AREA OF INTEREST FOR ECONOMIC GROWTH—*(INCREASE TOURISM 2X)*
  - THE ECONOMIC DEVELOPMENT & COMMERCE DEPARTMENT IS CURRENTLY LOOKING AT DEVELOPING AN OCEAN SCIENCE AND TECH PARK
  - PR IS AN ISLAND
  - THE BLUE ECONOMY PRESENTS A DIVERSIFIED ECONOMIC GROWTH OPPORTUNITY, TOURISM BEING A KEY COMPONENT

- FLORIDA HAS BEEN DEVELOPING A STRATEGIC ROADMAP FOR INNOVATION & GROWTH IN THE MARINE SCIENCES CLUSTER (2015)
Economic Activities

SUPPORT INFRASTRUCTURE For ECONOMIC GROWTH

The Blue Economy—a Promise for Sustainable Growth in the Caribbean

- World Bank Group 2016
CURRENT NCR-RSF COASTAL WORKING GROUP
TOURISM ANCHOR ASSETS

Coastal Working Group (DNER/NOAA/DIO)

- Coral
  - Coral Reef Assessments (NOAA and DRMA)
  - Coral Reef Recovery Strategies (TBD)
- Coastal Wetlands
  - Coastal Wetlands (Ambienta Inc./DNER)
  - Coastal Wetland Recovery Strategies (TBD)
- Beach Erosion
  - Beach Erosion (UPR-MY/DNER)
  - Mangrove Recovery Strategies (TBD)
- Sea Grasses
  - Seagrass Assessments (TBD)
  - Seagrass Recovery Strategies (TBD)
- Mangrove
  - Mangrove Assessments (RTR/DNER)
  - Mangrove Recovery Strategies (TBD)
- Dunes
  - Dune Assessments (UPR Aguadilla/USFWS)
  - Dunes Recovery Strategies (TBD)

Assessment Impacts
Implement Recovery Strategies
**CORAL REEF VALUED AT $1.9 BILLION** (ROBERT CONSTANZA, CRAWFORD SCHOOL OF PUBLIC POLICY, NATIONAL UNIVERSITY OF AUSTRALIA, IN 2014)

80% SEVERELY DAMAGED

Puerto Rico has approximately 700 miles of shoreline (NOAA Office for Coastal Management)

Describing the Ocean Economies of the U.S. Virgin Islands and Puerto Rico, NOAA 2016

<table>
<thead>
<tr>
<th>Ocean Sectors</th>
<th>Establishments</th>
<th>Employment</th>
<th>Total Wages ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Resources</td>
<td>14</td>
<td>10</td>
<td>$145,331</td>
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<tr>
<td>Marine Construction</td>
<td>39</td>
<td>642</td>
<td>$19,616,175</td>
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<tr>
<td>Marine Transportation</td>
<td>123</td>
<td>3,406</td>
<td>$103,046,369</td>
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<tr>
<td>Offshore Mineral Resources</td>
<td>43</td>
<td>17</td>
<td>$334,582</td>
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<tr>
<td>Ship and Boat Building</td>
<td>5</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Tourism and Recreation</td>
<td>4,091</td>
<td>62,645</td>
<td>$798,495,848</td>
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<tr>
<td>Ocean Economy</td>
<td>4,295</td>
<td>66,720</td>
<td>$921,838,905</td>
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<tr>
<td>Total Economy</td>
<td>48,513</td>
<td>929,764</td>
<td>$24,903,000,000</td>
</tr>
</tbody>
</table>

Ocean Economy estimated total wages $922 M/yr.

Note: "ND" represents data that are "non-disclosed" for privacy purposes for industries below a certain size.
Comparison of Sport Angler contribution to the Ocean Economy vs Commercial Fisheries

Sport Angler Expenditures
~100,000 recreational Fishermen

- Marine Rec. Fishing: $72,000,000
- Trip Expenditures: $16,000,000
- Durable Goods: $56,000,000
- Angler Exp. Billfish: $44,000,000

Commercial Fishermen Catch Wholesale Value: $6.9 million
Fishery Impact

Loss of 7 out 8 Fish
Aggregating Devices

![Graph showing fish catch in pounds for 2016 and 2017.]

42 fishing associations
868 active fishermen

Fish in Pounds

<table>
<thead>
<tr>
<th>Year</th>
<th>Catch in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>3,738,920</td>
</tr>
<tr>
<td>2017</td>
<td>624,690</td>
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</tbody>
</table>

https://www.st.nmfs.noaa.gov/SASStoredProcess/
Over 283 schools will not re-open in August
Repurposing assets for BLUE Economy Business Innovation
Ag added value business incubation, Co-working spaces, Workforce Development Training Centers, SBIR workshop centers, Business Incubators and Accelerators, etc.
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Ocean Economy Impact on IOT and Informatics

All Fiber Communications is through underwater infrastructure around PR mainly in SJ

Data Driven Innovation

Marine Robotics

Modeling Climate Change

[Images of a map, a robot, and computer models]
DEFINE STRATEGIES TO GROW TOURISM

• SUPPORT BEACH ACTIVITIES WITH LIMITED NEAR SHORE ASSETS?
  • NEED TO REDEFINE BEACHES AS CURRENTLY DEFINED IN CAT G MITIGATION*

• SUPPORT SEAFOOD CONSUMPTION WHEN THERE IS LIMITED FISHERY CAPACITY?

• GROW MARINE BUSINESS INNOVATIONS WITH INADEQUATE INFRASTRUCTURE?

• SUPPORT OCEAN ECONOMIC ACTIVITY THROUGHOUT PR WITH NO INTERCONNECTIVITY AMONGST PROJECTS?

• EMPOWER PUERTO RICO TO CROSS-INTEGRATE COASTAL ISLAND ASSETS?

DEVELOP MORE RESILIENCY TO ECONOMIC SUSTAINABILITY WITH CONSCIENTIOUS INVESTMENTS IN VISITOR ATTRACTION ASSETS!
PUERTO RICO OCEAN ECONOMY

Leadership & Coordination

Tourism

Fishery
Inter-agency Approach

Protect

Stimulate

Sustain

Economic Development Opportunity
Optimizing Ocean Economy Assets

USDA-Forest service- IIFS
Mitigation Coastal Storm Surge—Coastal Municipalities

Mitigation: Reduce coastal storm surge. Could be eligible for FEMA mitigation funds.
FISHERY INFRASTRUCTURE
Living breakwater co-benefits: supports fish breeding habitats

FAD Network
NOAA
DOI-WSFR

Artificial Reefs
NOAA

Mangroves
ECONOMIC DEVELOPMENT INFRASTRUCTURE

Mooring Buoy grid to protect reefs

Fishing Peers and Marinas

Fresh Fish Markets and Fishing Villages

Outreach & Community Engagement
OUTREACH TO STAKEHOLDERS TO RECRUIT PARTNERS AND CHAMPIONS

- UPRM CENTER FOR APPLIED OCEAN SCIENCE & ENGINEERING- CARICOOS
  - UNIVERSITY OF PR, MAYAGUEZ SEA GRANT PROGRAM
- ATLANTIC CARIBBEAN CENTER FOR MARINE INNOVATION & RESEARCH (ACCMIR)
- OCEAN ECONOMY RELATED TRADE ASSOCIATIONS AND NONPROFITS
- PR SCIENCE AND TECHNOLOGY RESEARCH TRUST
- DIVE SHOPS THROUGHOUT PR
- COASTAL MUNICIPALITIES (MITIGATION NEEDS FOR STORM SURGE PROTECTION)
- PR MARINE MAMMAL STRANDING NETWORK
Fish Aggregating Devices (FADs)

Living Breakwaters

Underwater Fishery Infrastructure

Fish Habitats

Boats, Piers, Marinas, Boardwalks

BLUE TIDE INITIATIVE

OCEAN ECONOMY INFRASTRUCTURE

Marine Innovation & Research Ctr. Business Incubators, Fish Markets, Fishing Villages...

TRANSFORMATIONAL INVESTMENTS

FEMA

USDA

Rural Development
30+ FADs
8 projects Living Breakwaters
20 sites for underwater fishery infrastructure
20 sites for fishery nurseries
50 sites for near shore/shore fishery infrastructure

~$3 M  ~$40 M  ~$5 M  ~$2 M  ~$20 M  ~$150 M

Marine Research Center
Incubators
Accelerators
Fish Markets
Fishing Villages
Water treatment facilities
Business Support
Work Force Development

Non-living resource support
Energy and Innovation
Entrepreneurial Development